

REMARKS

Claims 1-25 are pending in this application. Claim 1 is the sole independent claim. No claims are amended in response to the rejections set forth in the outstanding Office Action.

Claim Rejections

Rejections under 35 U.S.C. §102 – *Link et al.*

Claims 1 and 10 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,664,916 (“*Link et al.*”). This rejection is respectfully traversed.

Link fails to disclose each and every feature recited in the rejected claims. For example, Link fails to disclose a redundant cooling device for an electric submarine drive motor, comprising a first cooling circuit and a second cooling circuit, adapted to transport thermal energy away from the electric submarine drive motor, wherein coolant of the first cooling circuit and coolant of the second cooling circuit are adapted to flow in counter-current through a stator cooling ring of the electric submarine drive motor, in a region of the electric submarine drive motor, as recited in independent claim 1.

Link relates to a single workpiece spindle of a lathe that is cooled by a coolant. The motor spindle is a combination of a work spindle, i.e., the shaft of a machine tool provided to hold a workpiece to be machined (column 1, lines 4-9). In Link, the motor spindle 10 is attached to a machine frame 12 of a machine tool. Two concentric pipes 30, 32 are inserted into the machine frame 12. The spindle housing 14 has several channel-like openings 42 which connect the coolant inlet channel 34 with the two outer coolant channels 44 and 46 which each surround a three-phase motor 48 (column 4, line 62 – column 5, line 11; Figs. 1 and 2).

It is alleged in the Office Action that Link discloses a redundant cooling device for an electric submarine drive motor, including a first cooling circuit and a second cooling circuit that are adapted to transport thermal energy away from the electric submarine drive motor, wherein the coolant of the first cooling circuit and the coolant of the second cooling circuit are adapted to flow in countercurrent through a stator cooling ring of the electric submarine drive motor, in a region of the electric submarine drive motor. It is noted that the Office Action fails to provide any corresponding structure in Link and merely refers to Fig. 2 of Link and the Abstract to support the rejection.

However, as discussed above, Figs. 1 and 2 of Link merely show a motor spindle 10 for a single work-piece spindle of a lathe that is mounted to a frame 12, the lathe having a three-phase electric motor to drive the spindle. Additionally, the Abstract of Link fails to disclose an electric submarine drive motor or any of the features relating to the electric submarine drive motor as alleged in the Office Action. Rather, the Abstract of Link merely discloses a machine spindle that is cooled by a coolant for a machine tool comprising a workpiece spindle and a drive motor having a rotor surrounding the workpiece spindle. As such, Link fails to disclose any of the features recited in the rejected claims.

It is further alleged that Link discloses the subject matter of dependent claim 10 which recites that “the coolant in the two cooling circuits is re-coolable by use of sea water in a water-water heat exchanger or water-air heat exchanger.” To support the rejection, the Office Action relies on column 2, lines 27-29 and 37-38 of Link. Specifically, the Office Action alleges that Link discloses the use of air as coolant which presumably is alleged to anticipate the use of sea water as coolant as recited in rejected claim 10. However, lines 27-29 of claim 2 merely recite that the coolant system of the motor spindle is designed for conducting air as a coolant. Similarly, lines 37-38 of column 2 reiterate the use of air as a coolant to prevent dirt in the cutting solutions used for workpiece machining from penetrating into the motor spindle.

Applicants respectfully submit that the disclosure of using air as a coolant to prevent debris from penetrating into a workpiece spindle fails to anticipate the use of sea water as a coolant in a heat exchanger of a redundant cooling system for an electric submarine drive motor. As Link fails to relate in anyway or disclose the features recited in the rejected claims, withdrawal of the rejection is respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 2, 4, 5, 11 and 19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Link in view of U.S. Patent No. 4,313,309 (“Lehman”); claims 12-14, 16 and 22 stand rejected under 35 U.S.C. 35 U.S.C. §103(a) as being unpatentable over Link and Lehman in view of U.S. Patent No. 5,196,746 (“McCabria”); claim 20 stands rejected over 35 U.S.C. §103(a) as being unpatentable over Link and Lehman in view of U.S. Patent No. 4,766,557 (“Twerdochlib”); claims 3, 5, 15, 24 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Link and Lehman in view of U.S. Patent No. 3,089,969 (“Wiedemann”);

claims 6, 8, 17 and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Link in view of U.S. Patent No. 6,901,765 ("Amaral et al."); claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Link and Amaral in view of Lehman; claims 9 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Link in view of U.S. Patent No. 6,596,175 ("Rowe"); claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Link in view of U.S. Patent No. 3,936,681 ("Liebe"); claim 18 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Link and Twerdochlib; and claim 23 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Link in view of U.S. Patent No. 4,916,341 ("Mantovani"). The rejections are respectfully traversed.

None of the applied references, whether considered alone or in combination, disclose or suggest each and every feature recited in the rejected claims. Further, claims 2-9 and 11-25 are allowable for their dependency on independent claim 1 for the reasons discussed above, as well as for the additional features recited therein. Moreover, none of Lehman, McCabria, Twerdochlib, Wiedemann, Amaral, Rowe, Liebe or Mantovani overcome the deficiencies of Link.

For example, Lehman, used to reject claims 2, 4, 5, 11 and 19, relates to a two-stage refrigerator used for medicine which has a high stage and low stage so that low temperatures can be obtained in a freezer compartment (Abstract of Lehman). The refrigerator of Lehman has one pump for a low cooling region and a one pump for a high cooling region. Thus, Lehman fails to relate in any way to an electric submarine drive motor, nor would such a refrigerator pump be useful in a submarine engine.

Additionally, there is no suggestion either in the references or to one of ordinary skill in the art to modify the cooling system of the lathe described in Link to include two refrigerator pumps as taught by Lehman. As such, the combination of references fails to render claims 2, 4, 5, 11 and 19 obvious.

Similarly, McCabria, used to reject claims 12-14, 16 and 22, relates to cooling and lubrication systems for aircraft generators. Thus, McCabria fails to relate in any way or disclose or suggest an electric submarine drive motor as recited in the rejected claims. Further, one of ordinary skill in the art would not seek to modify the lathe of Link with the generator cooling and lubrication system for an aircraft generator of McCabria as there is not suggestion or motivation to do so in either of the references or in the general knowledge of those of skill in the art.

In rejecting claim 20, it is alleged in the Office Action that it would have been obvious to one of ordinary skill in the art to further combine the teachings of Twerdochlib with Link and Lehman. The applied reference of Twerdochlib relates to an apparatus which can detect a cracked stator coil, or other portion of a stator coil water cooling system used in electric generators that are driven by steam turbines. Thus, the additional reference of Twerdochlib fails to disclose or suggest an electric submarine drive motor. Moreover, one of skill in the art would not look to the teachings of Twerdochlib to modify the lathe of Link as the references relate to disparate art and seek to resolve different problems.

Wiedemann, used to reject claims 3, 5, 15, 24 and 25, relates to an electric turbo generator and a cooling system for the electric turbo generator. Thus, the supplemental reference of Wiedemann also fails to disclose or suggest an electric submarine drive motor and, therefore, fails to overcome the deficiencies of Link and Lehman. Further, there is no motivation or suggestion in Wiedemann or in the general knowledge of those of skill in the art to modify the lathe disclosed in Link with the teachings of an electrical turbo generator as taught by Wiedemann.

Amaral, used to reject claims 6, 8, 17 and 21 in combination with Link, relates to a temperature regulation apparatus for a motor vehicle, such as an air conditioner in a car. Thus, Amaral fails to disclose or suggest an electric submarine drive motor. Moreover, there is no motivation or suggestion to modify the lathe of Link with the teachings of the car air conditioner described in Amaral.

Amaral is also used to reject claim 7 in combination with Link and Lehman. However, as discussed above, the combination of references fail to relate in anyway to a submarine drive motor, nor are they combinable.

Rowe, used to reject claims 9 and 17 in combination with Link, relates to liquid cooling systems for large industrial electric power generators that have liquid cooled stators. As such, Rowe fails to disclose or suggest an electric submarine drive motor. Also, there is no suggestion or motivation to modify the lathe of Link with a stator cooling system for an industrial electrical power generator.

Liebe, used to reject claim 10 in combination with Link, relates to a cooling arrangement for electrical generators of underwater power plants. Specifically, it is alleged in the Office Action that Link does not disclose using sea water in the heat exchanger recited in claim 10

(Applicants note that the Examiner does allege that Link discloses this feature in the §102 rejection). It is also alleged that Liebe discloses the use of sea water in such an exchanger. However, although Liebe appears to disclose the use of water in the coolant transfer system, it does not appear that Liebe discloses the use of sea water as recited in the rejected claims. Moreover, even if Liebe were interpreted to disclose such a feature, claim 10 is allowable for its dependency on independent claim 1 as discussed above.

Claim 18 is rejected as being unpatentable over the combination of Link and Twerdochlib. However, as discussed above, neither of the references relates in any way to an electric submarine drive motor and are not combinable.

Mantovani, used to reject claim 23 in combination with Link, relates to an electric arbor that is integrated with an induction motor for high performance uses. As such, Mantovani fails to disclose or suggest a submarine electric drive motor. Moreover, there is no suggestion or motivation to combine the references as suggested in the Office Action. As Link relates to machine tools, such as lathes and the cooling of such machinery, and seeks to resolve problems associated therewith and Mantovani seeks to address problems associated with electric arbors in induction motors, there is no suggestion or motivation to combine the references nor to combine the references in an effort to resolve the problems in electric submarine drive motors, as in the present application.

Applicants respectfully remind the Examiner that marine and/or naval vehicles are subject to very specific safety requirements and, therefore, have a design that fundamentally differs from that of fixed installations on land. As such, the application of such references in rejected the present claims is inappropriate when examining the present claims. Applicants respectfully refer the Examiner to U.S. Patent No. 5,229,677, submitted concurrently herewith in an Information Disclosure Statement, which shows one example of electric drives in submarines. As none of the applied references disclose or suggest the features recited in the rejected claims, withdrawal of the rejections is respectfully requested.

CONCLUSION

In view of the above remarks and amendments, Applicants respectfully submit that each of the rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Fitzpatrick at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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